REMARKS

Claims 1-8 are pending in the Office Action. Claims 1-8 are rejected. Claims 1, 4, and 5 have been amended. Claim 3 has been cancelled. No new matter has been added. The rejections of the claims are respectfully traversed in light of the amendments and following remarks, and reconsideration is requested.

Applicant would like to briefly highlight Applicant's invention. The present invention is directed to a contact probe which is applied to an object that includes solid solder. When the contact probe is applied to such an object repeatedly, the solder from such object to be contacted may gradually transfer and deposit on the contact surface of the contact probe over time. Such deposition of solder on the contact surface is not desirable as it prevents a stable conductance of electricity between the object and the contact surface of the contact probe. The present invention prevents such contamination of the contact probe by placing a coating of gold added with silver over the contact surface of the contact probe.

Objection to Specification

The Examiner objected to the Specification stating that the title of the invention is not descriptive and that a new title is required that is clearly indicative of the invention to which the claims are directed.

The title has been amended to be more descriptive by reciting, "Conductive Contact Member Having a Contact Surface Protected From Solder Deposition".

Rejections Under 35 U.S.C. § 102

Claims 1-3 are rejected under 35 U.S.C. § 102(a) as being anticipated by DiRenzo (U.S. Patent No. 3,599,326).

In rejecting the claims, the Examiner writes in part:

> In regard to claim 1, DiRenzo discloses a conductive contact member 12 comprising a layer of highly electrically conductive material resistant to solder deposition (see Fig. 6 and Col. 1, lines 71-72 and Col. 3, lines 1-9, 22-24) formed at least over a conductive contact part of the contact member (Col. 3, line 32).
>
> In regard to claim 2, the layer formed by plating (Col.3, lines 22-24).

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> In regard to claim 3, material is gold added with silver – DiRenzo (3599326) teaches a solder resistant coating [comprising] electroplating layer of silver (about .000025 inch) thick on the gold plated pin (Col. 3, lines 1-9, 22-24).

However, DiRenzo discloses the following:

> [T]he present invention contemplates a method of manufacturing printed circuit boards of the type having a plurality of contact pins projecting from one side thereof, and which pins are adapted for use as wire wrap terminals connecting board-carried wiring to external circuits. The method includes selectively coating portions of the pins . . . with a material to which solder will not adhere to maintain the portions free of solder and in condition for making of wire wrap connections, followed by subjecting the boards and pins to a batch of molten solder to connect the pins to the circuits carried by the board. (DiRenzo, col.1, ll.36-47).
>
> Still another method for applying a solder resistant coating comprises electroplating a layer of silver about .000025 inch thick on the gold plated pin to within about one-sixteenth inch of the solder pad. . . . The assembly is then subjected to a hydrogen sulfide enriched atmosphere, whereby the silver coating is converted to silver sulfide which will reject solder during the wave soldering operation. The silver sulfide . . . is conductive and the ensuing wire wrap connection is as effective as if made directly to the untreated gold plated pin surface. (DiRenzo, col.3, ll.22-33) (emphasis added).

Thus, DiRenzo discloses an arrangement for preventing adherence of molten solder onto portions of pins that project from a printed circuit board when the circuit board is immersed or placed over a solder bath. Ultimately, the contact portions of the pins are connected to circuits by molten solder and should be able to adhere to solder. DiRenzo further discloses a layer of silver which is converted to silver sulfide over a gold plated pin. DiRenzo does not disclose or suggest solder in solid form being an object to be contacted by the contact member. DiRenzo also does not disclose or suggest using a material consisting of gold added with silver to form a solder-resistant layer over a contact part of the contact member.

Claim 1 is rejected under 35 U.S.C. § 102(a) as being anticipated by Friend (U.S. Patent No. 3,864,004). In rejecting the claims, the Examiner writes in part:

> In regard to claim 1, Friend discloses a conductive contact member 20 comprising a layer of highly electrically conductive material resistant to solder deposition (see Fig. 5 and Col. 2, lines 58-66) formed at least over a conductive contact part of the contact member.

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However, Friend discloses an "improved circuit board socket of the type having a socket body and a disconnect spring confined within the interior of the body. The exterior surface of the body is solder adherent while the interior surface of the body is solder resistant so that molten solder will not adhere to the interior surface." (Friend, col.1, ll.18-24). Friend does not disclose or suggest solder in solid form being an object to be contacted by the contact member. Friend also does not disclose or suggest using a material resistant to solder deposition and consisting of gold added with silver to form a layer over a contact part of the contact member.

Claims 1-2 are rejected under 35 U.S.C. § 102(e) as being anticipated by Akram et al. (U.S. Patent No. 6,426,642). In rejecting the claims, the Examiner writes in part:

> Akram discloses a conductive contact member 62 comprising a layer of highly electrically conductive material resistant to solder deposition 64 (see Fig. 22-24) formed at least over a conductive contact part of the contact member.

Akram discloses the "formation of an insert for receiving and testing a . . . chip-scale-packaged microelectronic device having an array of outwardly projecting contacts, e.g., of a ball-grid-array or bump-grid-array (BGA). Such insert may also be known by other terms such as, for example, interconnect, interposer, socket, BGA test socket, or silicon insert." (Akram, col.4, ll.52-58). Such an insert includes a plurality of pockets 16 for receiving the solder balls of the device to be tested. *See* Akram, Figs. 14 and 29.

Akram further discloses:

> [A] first conductive material 62 is formed conformably over . . . the walls of pockets 16. In an exemplary embodiment, conductive material 62 . . . comprises metal wetable by solder. Preferably, conductive layer 62 comprises copper . . . . Alternative metals for conductive material 62 include gold, palladium, nickel, chromium, or alloys thereof.
>
> After forming conductive material 62, second conductive material 64 is formed over first conductive material 62 . . . . The second conductive material comprises material different from the first conductive material 62 and is selected to resist bonding to solder. In certain exemplary embodiments, second conductive material 64 comprises a metal such as tungsten, titanium, platinum, titanium nitride or titanium-tungsten. (Akram, col.10, ll.36-53) (emphasis added).

Thus, Akram discloses a second conductive material 64 selected to resist bonding to solder and that is different from gold or alloys thereof. Accordingly, Akram does not disclose

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or suggest using a "material resistant to solder deposition and essentially consisting of gold added with silver" to form a layer over a contact part of the contact member.

In contrast, Claim 1 recites a "conductive contact member for establishing an electric contact by being applied to an object to be contacted that includes solid solder, comprising a layer of highly electrically conductive material resistant to solder deposition and essentially consisting of gold added with silver, the layer being formed at least over a conductive contact part of said conductive contact member so that said conductive contact part of said conductive contact member may not be contaminated by deposition of solder from said object to be contacted." Therefore, because DiRenzo, Friend, and Akram do not disclose or suggest all the limitations of Claim 1, Claim 1 is patentable over DiRenzo, Friend, and Akram, alone or in combination.

Claim 2 is dependent on Claim 1 and contains additional limitations that further distinguish it from DiRenzo, Friend, and Akram, alone or in combination. Therefore, Claim 2 is allowable over DiRenzo, Friend, and Akram, alone or in combination, for at least the same reasons provided above with respect to Claim 1.

Claim 3 has been cancelled, thus obviating the Examiner's rejection with respect to Claim 3.

In view of the foregoing, Applicant respectfully requests that the rejections under 35 U.S.C. § 102 be withdrawn.

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Rejections Under 35 U.S.C. § 103

Claims 4 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over DiRenzo. Claims 4 and 6 are dependent on Claim 1 and contain additional limitations that further distinguish them from DiRenzo. Therefore, Claims 4 and 6 are allowable over DiRenzo for at least the same reasons provided above with respect to Claim 1.

Claims 1 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kazama (U.S. Patent No. 5,200,695) in view of Roth (U.S. Patent No. 4,511,076) and Kister (U.S. Patent No. 5,720,098). In rejecting the claims, the Examiner writes in part:

> In regard to claim 1, Kazama discloses a conductive contact member 1 for establishing an electrical contact by being applied to an object to be contacted. Kazama does not disclose a layer of highly electrically conductive material resistant to solder deposition formed at least over a conductive contact part of the contact member.
> Roth teaches a solder resistant/repellant substance applied to portions where it desired the solder not adhere (Col. 3, line 26-30) and Kister teaches a coating 94 on the contact portion of contact/probe [9]0 (see Fig. 8 and Col.6, lines 13-20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made and for same reason to cover a contact part 22a of Kazama with a layer of conductive material resistant to solder deposition as taught by Roth and Kister. (emphasis added).

Roth discloses the following:

> FIG. 2 shows the feed lines 6.1 and 6.2 of the diode 6, soldered to the copper strips 2 and 3 of the circuit board. The soldering is here generally done by machine, for example using the drag solder method, in which the entire upper side of the circuit board is brought into contact with liquid solder, whereby all the solder junctions are fabricated in one working step.
>
> It is well known in the art of machine soldering (for example, using the drag soldering method mentioned above) that savings in the cost of materials can be realized by coating the upper surface of the printed circuit board with an electrically insulating and solder-repellant substance (e.g., a varnish). The electrically insulating and solder-repellant substance is applied to those portions of the upper surface where it is desired that solder not adhere. The electrically insulating and solder-repellant substance may be applied in an appropriate pattern, for example, by a screening process, leaving the soldering lugs 2.1 and 3.1 uncoated to be exposed to solder during the soldering step. (Roth, col.3, ll.14-33).

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Thus, Roth discloses the prevention of the adhesion of liquid solder to portions of a circuit board in order to fabricate all the solder junctions in one working step. Soldering lugs (i.e., contact part) are left uncoated to be exposed to solder during the soldering step. Roth does not disclose or suggest preventing adhesion of solder to portions of a circuit board that will be used as a contact part of a contact member.

Kister discloses the following:

> FIG. 8 shows a specially treated tip 90 of a probe 92 according to the invention. A coating 94 encapsulates tip 90. The addition of such coating can take place after sanding of tip 90. Electroplating, sputtering, or any other suitable processes can be used to deposit coating 94. Conventional, wear-resistant coatings are preferred, e.g., the MAP35N cobalt alloy or rhodium. (Kister, col.6, ll.14-20) (emphasis added).

Thus, Kister only discloses the coating of a contact tip with wear-resistant material.

Accordingly, Roth and Kister neither disclose or suggest a coating "material resistant to solder deposition and essentially consisting of gold added with silver" to form a layer over a contact part of a contact member for preventing deposition of solder in solid form transferred from an object to be contacted.

In contrast, Claim 1 recites a "conductive contact member for establishing an electric contact by being applied to an object to be contacted that includes solid solder, comprising a layer of highly electrically conductive material resistant to solder deposition and essentially consisting of gold added with silver, the layer being formed at least over a conductive contact part of said conductive contact member so that said conductive contact part of said conductive contact member may not be contaminated by deposition of solder from said object to be contacted." Therefore, because Kazama, Roth, and Kister do not disclose or suggest all the limitations of Claim 1, Claim 1 is patentable over Kazama, Roth, and Kister, alone or in combination.

Claim 5 is dependent on Claim 1 and contains additional limitations that further distinguish it from Kazama, Roth, and Kister, alone or in combination. Therefore, Claim 5 is allowable over Kazama, Roth, and Kister, alone or in combination, for at least the same reasons provided above with respect to Claim 1.

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Claims 1, 7, and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Loranger et al. (U.S. Patent No. 5,791,914 hereinafter "Loranger") in view of Roth and Means (U.S. Patent No. 3,239,297). In rejecting the claims, the Examiner writes in part:

> In regard to claim 1, Loranger discloses a conductive contact member 11 for establishing an electrical contact by being applied to an object to be contacted. Loranger does not disclose a layer of highly electrically conductive material resistant to solder deposition formed at least over a conductive contact part of the contact member.
> Roth teaches a solder resistant/repellant substance applied to portions where it desired the solder not adhere (Col. 3, line 26-30) and Means teaches a coating 17 on the spring loop 14, 16 of conductive wire. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made and for same reason to cover a contact part 29 of Fodali with a layer of conductive material resistant to solder deposition as taught by Roth and Means.

Applicant believes the Examiner's reference to Fodali was made in error and these remarks are based upon the assumption that the Examiner meant to state that "it would have been obvious to one having ordinary skill in the art at the time the invention was made and for same reason to cover a contact part 29 of Loranger."

Roth does not remedy the deficiencies of Loranger for the same reasons stated above in conjunction with Kazama and Kister. In particular, Roth only discloses the prevention of the adhesion of liquid solder to portions of a circuit board in order to fabricate all the solder junctions in one working step. Soldering lugs (i.e., contact part) are left uncoated to be exposed to solder during the soldering step. Roth does not disclose or suggest preventing adhesion of solder to portions of a circuit board that will be used as a contact part of a contact member.

Means discloses the following:

> In order to guarantee the spring action of the loops 14, the wire is treated in appropriate [areas] by plating, oxidizing or chemical solutions such as the sulfides to resist the acceptance of solder. The special selective areas are shown in the figures as shaded areas and are designated by the numeral 17. If the connector is formed from material that readily accepts solder, capillary action may take place soldering the arms 13 to the contact segments 16 or the circuitry 11. The spring loop 14 would then be isolated, resulting in a rigid connection similar to those previously described. However, if the connector material is treated as previously mentioned, an investigation of the figures indicates that even when dip soldered, portions of the spring loop 15 and the extending arms 13 will resist

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> solder. The arms 13 will not adhere to the circuitry 11, the adjacent parts of the spring loop 14, or the contact segments 16, even though the contact segments 16 of the spring loop 14 will be solidly soldered to the circuitry 11. It is also pointed out that solder will not build up on the spring loop 14 nor solder the arms 13 together with the resulting loss of spring action. (Means, col.2, l.58-col.3, l.13).

Thus, Means only discloses application of plating, oxidizing, or chemical solutions to areas of a loop 14 in order to "guarantee the spring action of the loops." Contact segments are not treated to resist solder but instead, "the contact segments 16 of the spring loop 14 will be solidly soldered to the circuitry 11." *See* Means, Figs. 1-6.

Accordingly, Roth and Means neither disclose or suggest a coating "material resistant to solder deposition and essentially consisting of gold added with silver" to form a layer over a contact part of a contact member for preventing deposition of solder in solid form transferred from an object to be contacted.

In contrast, Claim 1 recites a "conductive contact member for establishing an electric contact by being applied to an object to be contacted that includes solid solder, comprising a layer of highly electrically conductive material resistant to solder deposition and essentially consisting of gold added with silver, the layer being formed at least over a conductive contact part of said conductive contact member so that said conductive contact part of said conductive contact member may not be contaminated by deposition of solder from said object to be contacted." Therefore, because Loranger, Roth, and Means do not disclose or suggest all the limitations of Claim 1, Claim 1 is patentable over Loranger, Roth, and Means, alone or in combination.

Claims 7 and 8 are dependent on Claim 1 and contains additional limitations that further distinguish it from Loranger, Roth, and Means, alone or in combination. Therefore, Claims 7 and 8 allowable over Loranger, Roth, and Means, alone or in combination, for at least the same reasons provided above with respect to Claim 1.

In view of the foregoing, Applicant respectfully requests that the rejections under 35 U.S.C. § 103 be withdrawn.

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CONCLUSION

For the above reasons, Applicant believes pending Claims 1-2 and 4-8 are now in condition for allowance and allowance of the Application is hereby solicited. If the Examiner has any questions or concerns, the Examiner is hereby requested to telephone Applicant's Attorney at (949) 752-7040.

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on June 16, 2003.

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June 16, 2003

Respectfully submitted,

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